

Continuous Gas Analyzers, extractive CALOMAT 6

General information

Overview



The CALOMAT 6 gas analyzer is primarily used for quantitative determination of H₂ or He in binary or quasi-binary non-corrosive gas mixtures.

Concentrations of other gases can also be measured if their thermal conductivities differ significantly from the residual gases like Ar, CO₂, CH₄, NH₃.

Benefits

- Small T₉₀ time due to micromechanical-produced Si sensor
- Universally applicable hardware basis, high measuring range dynamics (e.g. 0 to 1 %, 0 to 100 %, 95 to 100 % H₂)
- Integrated correction of cross-interference, no external calculation required
- Open interface architecture (RS 485, RS 232, PROFIBUS)
- SIPROM GA network for maintenance and service information (option)
- Electronics and analyzer part: gas-tight separation, purgeable, IP65, long service life even in harsh environments
- Ex(p) for Zones 1 and 2 (in accordance with 94/9/EC (ATEX 2G and ATEX 3G), and Class 1 Div 2 (CSA) Ex(n))

Application

Fields of application

- Pure gas monitoring (0 to 1 % H₂ in Ar)
- Protective gas monitoring (0 to 2 % He in N₂)
- Hydroargon gas monitoring (0 to 25 % H₂ in Ar)
- Forming gas monitoring (0 to 25 % H₂ in N₂)
- Gas production:
 - 0 to 2 % He in N₂
 - 0 to 10 % Ar in O₂
- Chemical applications:
 - 0 to 2 % H₂ in NH₃
 - 50 to 70 % H₂ in N₂
- Wood gasification (0 to 30 % H₂ in CO/CO₂/CH₄)
- Blast furnace gas (0 to 5 % H₂ in CO/CO₂/CH₄/N₂)
- Bessemer converter gas (0 to 20 % H₂ in CO/CO₂)
- Monitoring equipment for hydrogen-cooled turbo-alternators:
 - 0 to 100 % CO₂/Ar in air
 - 0 to 100 % H₂ in CO₂/Ar
 - 80 to 100 % H₂ in air
- Versions for the analysis of flammable and non-flammable gases or vapors for use in hazardous areas (Zone 1 and Zone 2)

Special versions

Special applications

In addition to the standard combinations, special applications are also available upon request (e.g. higher sample gas pressure up to 2 000 hPa absolute).

Design

19" rack unit

- With 4 HU for installation
 - in hinged frame
 - in cabinets with or without telescopic rails
- Front plate for service purposes can be pivoted down (laptop connection)
- Internal gas paths: stainless steel pipe (mat. no. 1.4571)
- Gas connections for sample gas inlet and outlet and for purging gas: fittings, pipe diameter of 6 mm or 1/4"

Field device

- Two-door enclosure (IP65) with gas-tight separation of analyzer and electronics sections
- Individually purgeable enclosure halves
- Stainless steel gas path and stubs (mat. no. 1.4571)
- Purging gas connections: pipe diameter 10 mm or 3/8"
- Gas connections for sample gas inlet and outlet: clamping ring connection for a pipe diameter of 6 mm or 1/4"

Display and control panel

- Large LCD panel for simultaneous display of:
 - Measured value (digital and analog displays)
 - Status bar
 - Measuring ranges
- Contrast of LCD panel adjustable using menu
- Permanent LED backlighting
- Washable membrane keyboard with five softkeys
- Menu-driven operation for parameterization, test functions, adjustment
- User help in plain text
- Graphic display of concentration trend; programmable time intervals
- Bilingual operating software German/English, English/Spanish, French/English, Spanish/English, Italian/English

Input and outputs

- One analog output per medium (from 0, 2, 4 to 20 mA; NAMUR parameterizable)
- Two analog inputs configurable (e.g. correction of cross-interference or external pressure sensor)
- Six binary inputs freely configurable (e.g. for measurement range switchover, processing of external signals from sample preparation)
- Six relay outputs freely configurable (e.g. failure, maintenance request, limit alarm, external solenoid valves)
- Each can be expanded by eight additional binary inputs and relay outputs (e.g. for autocalibration with max. four test gases)

Communication

RS 485 present in basic unit (connection from the rear; for the rack unit also behind the front plate).

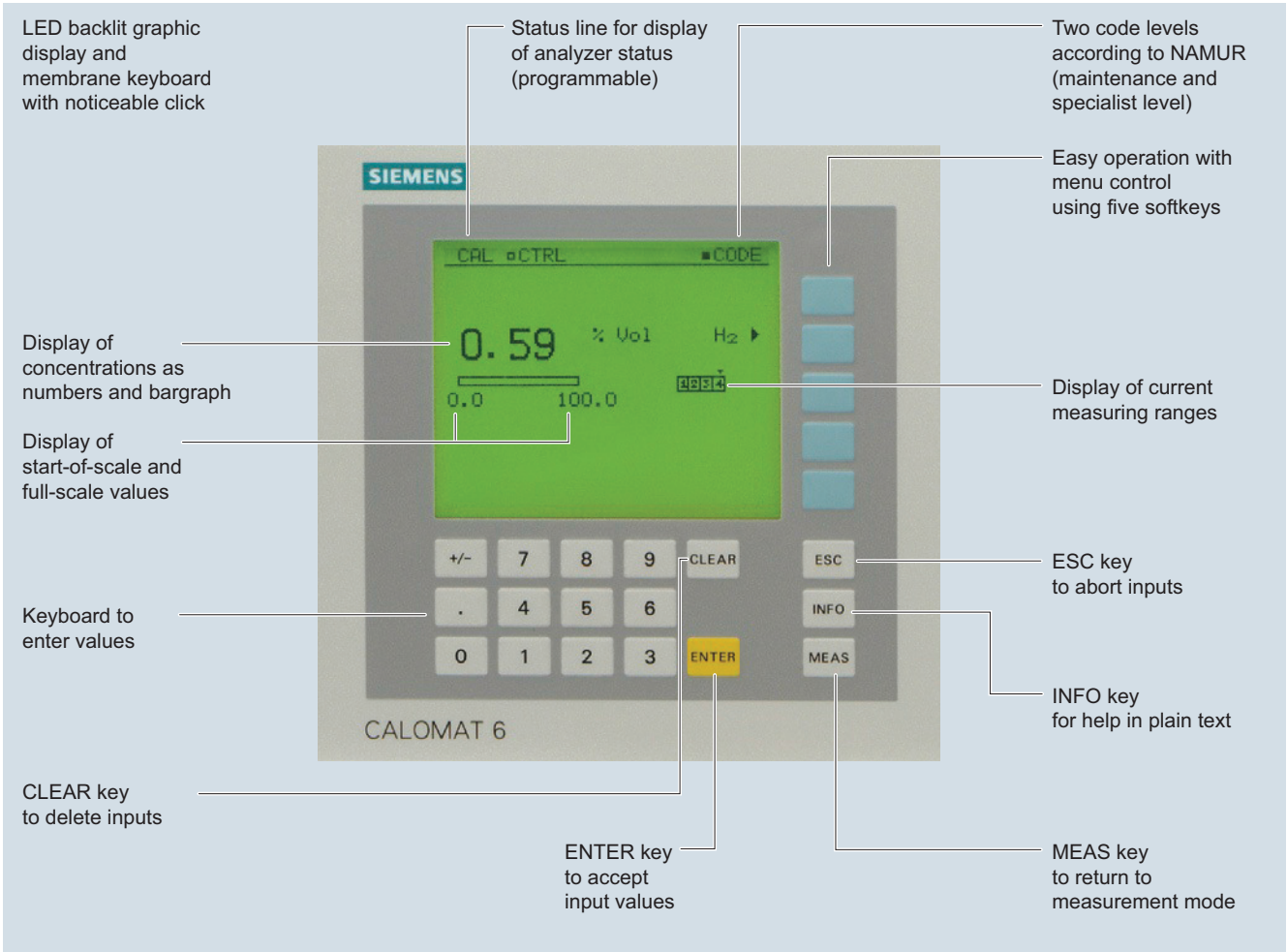
Options

- RS 485/RS 232 converter
- RS 485/Ethernet converter
- RS 485/USB converter
- Connection to networks via PROFIBUS DP/PA interface
- SIPROM GA software as the service and maintenance tool

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CALOMAT 6, membrane keyboard and graphic display

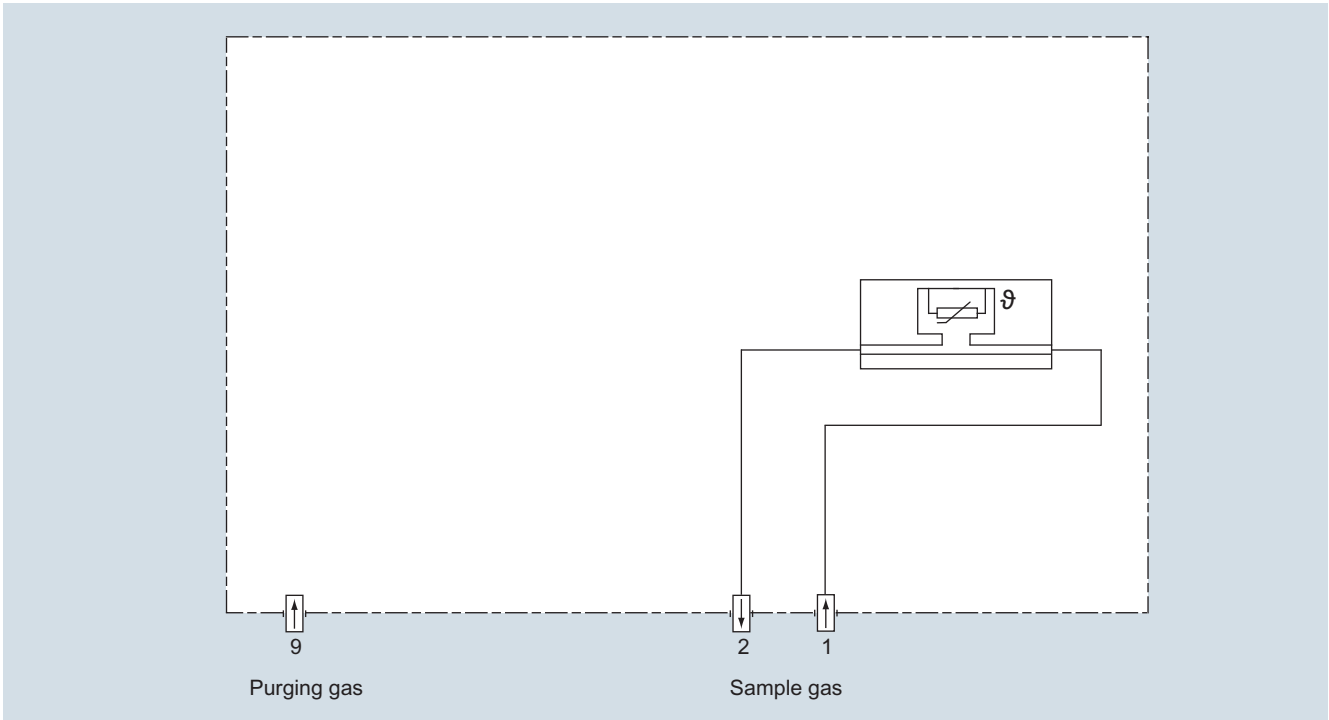
Designs – parts wetted by sample gas

Gas path		19" rack unit	Field device	Field device Ex
With pipes	Bushing	Stainless steel, mat. no. 1.4571		
	Pipe	Stainless steel, mat. no. 1.4571		
	Sample cell body	Stainless steel, mat. no. 1.4571		
	O-rings	FFKM-Chemraz		
	Sensor	Si, SiO _x N _y , AU, epoxy resin, glass		
	Tightness	Leakage < 1 µl/s		

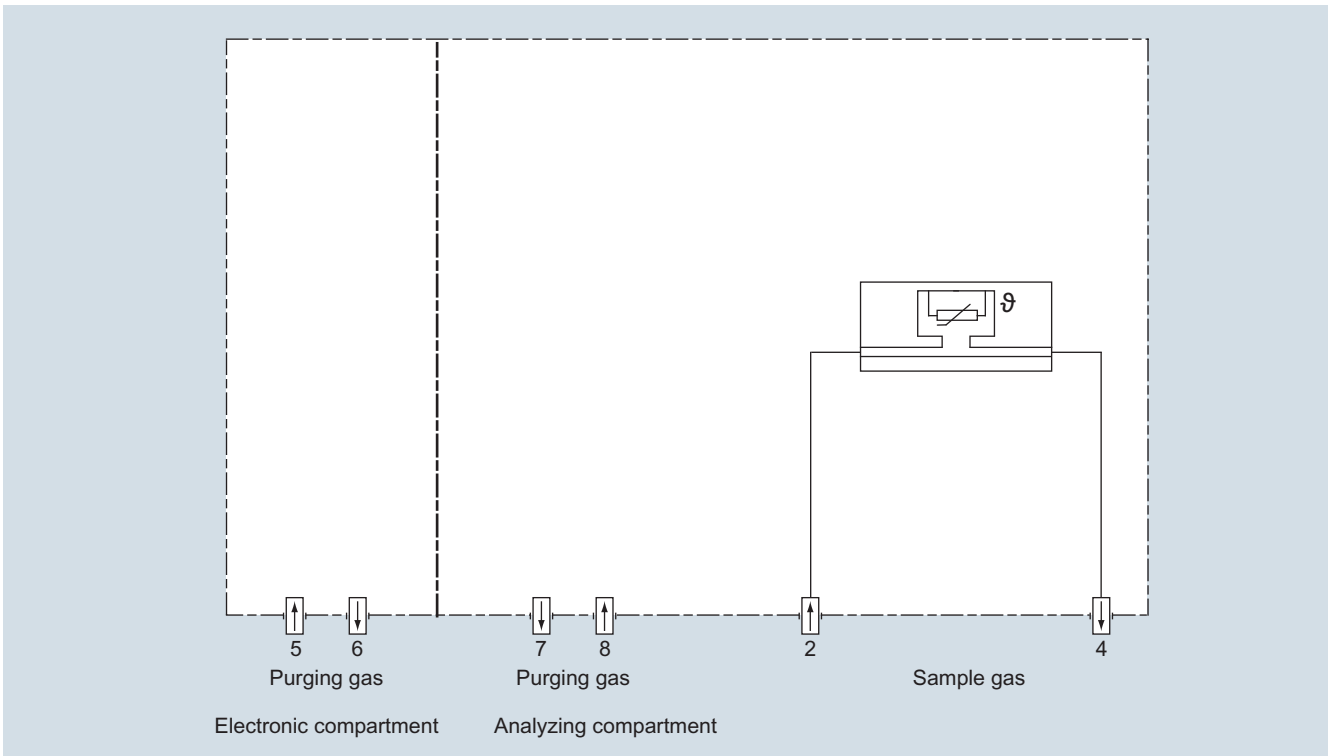
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CALOMAT 6, 19" rack unit, gas path



CALOMAT 6, field device, gas path

Function

Principle of operation

The measuring principle is based on the different thermal conductivity of gases.

The CALOMAT 6 works with a micromechanically produced Si chip whose measuring membrane is equipped with thin-film resistors.

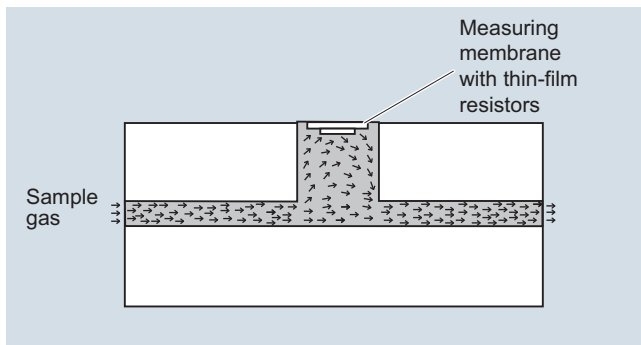
The resistors are kept at a constant temperature. This requires an current intensity depending on the thermal conductivity of the sample gas. This "raw value" is processed further electronically to calculate the gas concentration.

The sensor is located in a thermostatically-controlled stainless steel enclosure in order to prevent the influence of changes in ambient temperature.

To prevent the influence of changes in flow, the sensor is positioned in a bore located to the side of the main flow.

Note

The sample gases must be fed into the analyzers free of dust. Condensation (dew point sample gas < ambient temperature) is to be avoided in the measurement chambers. Therefore, the use of gas modified for the measuring tasks is necessary in most application cases.



CALOMAT, principle of operation

Essential characteristics

- Four freely parameterizable measuring ranges, also with suppressed zero point, all measuring ranges linear
- Smallest measuring spans up to 1 % H₂ (with disabled zero point: 95 to 100 % H₂) possible
- Measuring range identification
- Galvanically isolated measured-value output 0/2/4 to 20 mA (also inverted)
- Autoranging or manual measurement range switchover possible; remote switching is also possible
- Storage of measured values possible during adjustments
- Wide range of selectable time constants (static/dynamic noise suppression); i.e. the response time of the analyzer can be matched to the respective measuring task
- Short response time
- Low long-term drift
- Measuring point switchover for up to 6 measuring points (programmable)
- Measuring range identification
- Measuring point identification
- External pressure sensor can be connected – for the correction of sample gas fluctuations
- Automatic range calibration can be parameterized
- Operation based on the NAMUR recommendation

- Two control levels with their own authorization codes for the prevention of accidental and unauthorized operator interventions
- Simple handling using a numerical membrane keyboard and operator prompting
- Customer-specific analyzer options such as:
 - Customer acceptance
 - TAG labels
 - Drift recording
 - Clean for O₂ service

Measuring spans

The smallest and largest possible spans depend on both the measured component (type of gas) and the respective application.

The smallest possible spans listed below refer to N₂ as the residual gas. With other gases which have a larger/smaller thermal conductivity than N₂, the smallest possible span is also larger/smaller.

Component	Smallest possible span
H ₂	0 ... 1 % (95 ... 100 %)
He	0 ... 2 %
Ar	0 ... 10 %
CO ₂	0 ... 20 %
CH ₄	0 ... 15 %
H ₂ in blast furnace gas	0 ... 10 %
H ₂ in converter gas	0 ... 20 %
H ₂ with wood gasification	0 ... 30 %

Influence of interfering gases

Knowledge of the sample gas composition is necessary to determine the influence of residual gases with several interfering components.

The following table lists the zero offsets expressed in % H₂ resulting from 10 % residual gas (interfering gas) in each case.

Component	Zero offset
Ar	-1.28 %
CH ₄	+1.59 %
C ₂ H ₆ (non-linear response)	+0.04 %
C ₃ H ₈	-0.80 %
CO	-0.11 %
CO ₂	-1.07 %
He	+6.51 %
H ₂ O (non-linear response)	+1.58 %
NH ₃ (non-linear response)	+1.3 %
O ₂	+0.18 %
SF ₆	-2.47 %
SO ₂	-1.34 %
100 % air (dry)	+0.27 %

For residual gas concentrations differing from 10 %, the corresponding multiple of the associated value in the table provides an acceptable approximation. This is valid for residual gas concentrations up to 25 % (dependent on type of gas).

The thermal conductivity of most gas mixtures has a non-linear response. Even ambiguous results, such as e.g. with NH₃/N₂ mixtures, can occur within a specific concentration range.

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In addition to a zero offset, it should also be noted that the gradient of the characteristic is influenced by the residual gas. However, this effect is negligible for most gases.

In case of correction of the influence of interfering gases with additional analyzers (ULTRAMAT 6/ULTRAMAT 23), the resulting measuring error can – depending on the application – amount up to 5 % of the smallest measuring range of the respective application.

Example of correction of cross-interference

Specification for the interface cable

Surge impedance	100 ... 300 Ω , with a measuring frequency of > 100 kHz
Cable capacitance	Typ. < 60 pF/m
Core cross-section	> 0.22 mm ² , corresponds to AWG 23
Cable type	Twisted pair, 1 x 2 conductors of cable section
Signal attenuation	Max. 9 dB over the whole length
Shielding	Copper braided shield or braided shield and foil shield
Connection	Pin 3 and pin 8

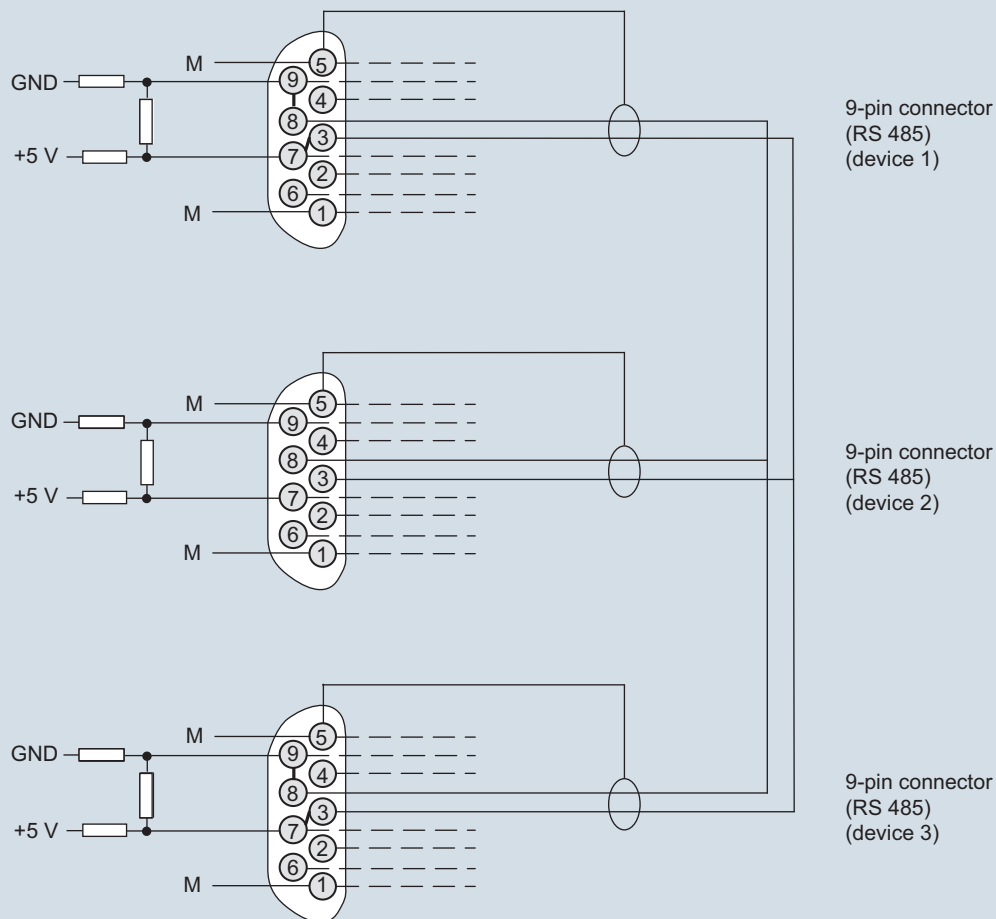
Bus terminating resistors

Pins 3-7 and 8-9 of the first and last connectors of a bus cable must be bridged (see image).

Note

It is advisable to install a repeater on the device side in the case of a cable length of more than 500 m or with high interferences.

Up to four components can be corrected via the ELAN bus, correction of cross-interference can be carried out for one or two components via the analog input.



Bus cable with plug connections, example

Technical specifications**General** (based on EN 61207/IEC 1207. All data refers to the binary mixture H₂ in N₂)

Measuring ranges	4, internally and externally switchable; automatic measurement range switchover also possible
Largest possible measuring span	100 vol.% H ₂ (for smallest measuring span, see "Function")
Measuring ranges with suppressed zero point	Any zero point within 0 ... 100 vol.% can be implemented, smallest possible measuring span: 5 % H ₂
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 61326/A1 and EN 61010/1

Design, enclosure

Degree of protection	IP20 according to EN 60529
Weight	Approx. 10 kg

Electrical characteristics

EMC (E lectromagnetic C ompatibility) (All signal lines must be shielded. Measured value deviations of up to 4 % of the smallest measuring range may occur in ranges with strong electromagnetic interference.)	In accordance with standard requirements of NAMUR NE21 (08/98)
Electrical safety	In accordance with EN 61010-1; overvoltage category II
Power supply (see rating plate)	100 V -10 % ... 120 V +10 % AC, 48 ... 63 Hz or 200 V -10 % ... 240 V +10 % AC, 48 ... 63 Hz
Power consumption	Approx. 20 VA
Fuse values	100 ... 120 V: 1.0T/250 200 ... 240 V: 0.63 T/250

Gas inlet conditions

Sample gas pressure	800 ... 1 100 hPa (absolute)
Sample gas flow	30 ... 90 l/h (0.5 ... 1.5 l/min)
Sample gas temperature	Min. 0 to max. 50 °C, but above the dew point
Temperature of the measuring cell	Approx. 60 °C
Sample gas humidity	< 90 % relative humidity

Dynamic response

Warm-up period	< 30 min (the technical specification will be met after 2 hours)
Delayed display (T ₉₀)	< 5 s
Damping (electrical time constant)	0 ... 100 s, parameterizable
Dead time (purging time of the gas path in the unit at 1 l/min)	Approx. 0.5 s

Measuring response (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Output signal fluctuation	< ± 0.75 % of the smallest possible measuring range according to rating plate, with electronic damping constant of 1 s (σ = 0.25 %)
Zero point drift	< ± 1 %/week of the smallest possible measuring span according to rating plate
Measured-value drift	< ± 1 %/week of the smallest possible measuring span according to rating plate
Repeatability	< 1 % of the current measuring range
Detection limit	1 % of the current measuring range
Linearity error	< ± 1 % of the current measuring range

Influencing variable (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Ambient temperature	< 1 %/10 K referred to smallest possible measuring span according to rating plate
Carrier gases	Deviation from zero point (for influence of interfering gas see paragraph titled "Interference influences")
Sample gas flow	< 0.2 % of the smallest possible span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range
Sample gas pressure	< 1 % of the current measuring range with a pressure change of 100 hPa
Power supply	< 0.1 % of the current measuring range with rated voltage ± 10 %

Electrical inputs and outputs

Analog output	0/2/4 ... 20 mA, isolated; load max. 750 Ω
Relay outputs	6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; load: 24 V AC/DC/1 A, isolated
Analog inputs	2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and correction of cross-interference
Binary inputs	6, designed for 24 V, isolated, freely parameterizable, e.g. for measurement range switchover
Serial interface	RS 485
Options	AUTOCAL function with 8 additional binary inputs and relay outputs each, also with PROFIBUS PA or PROFIBUS DP

Climatic conditions

Permissible ambient temperature	-30 ... +70 °C during storage and transportation, 5 ... 45 °C during operation
Permissible humidity (dew point must not be undershot)	< 90 % relative humidity as annual average, during storage and transportation

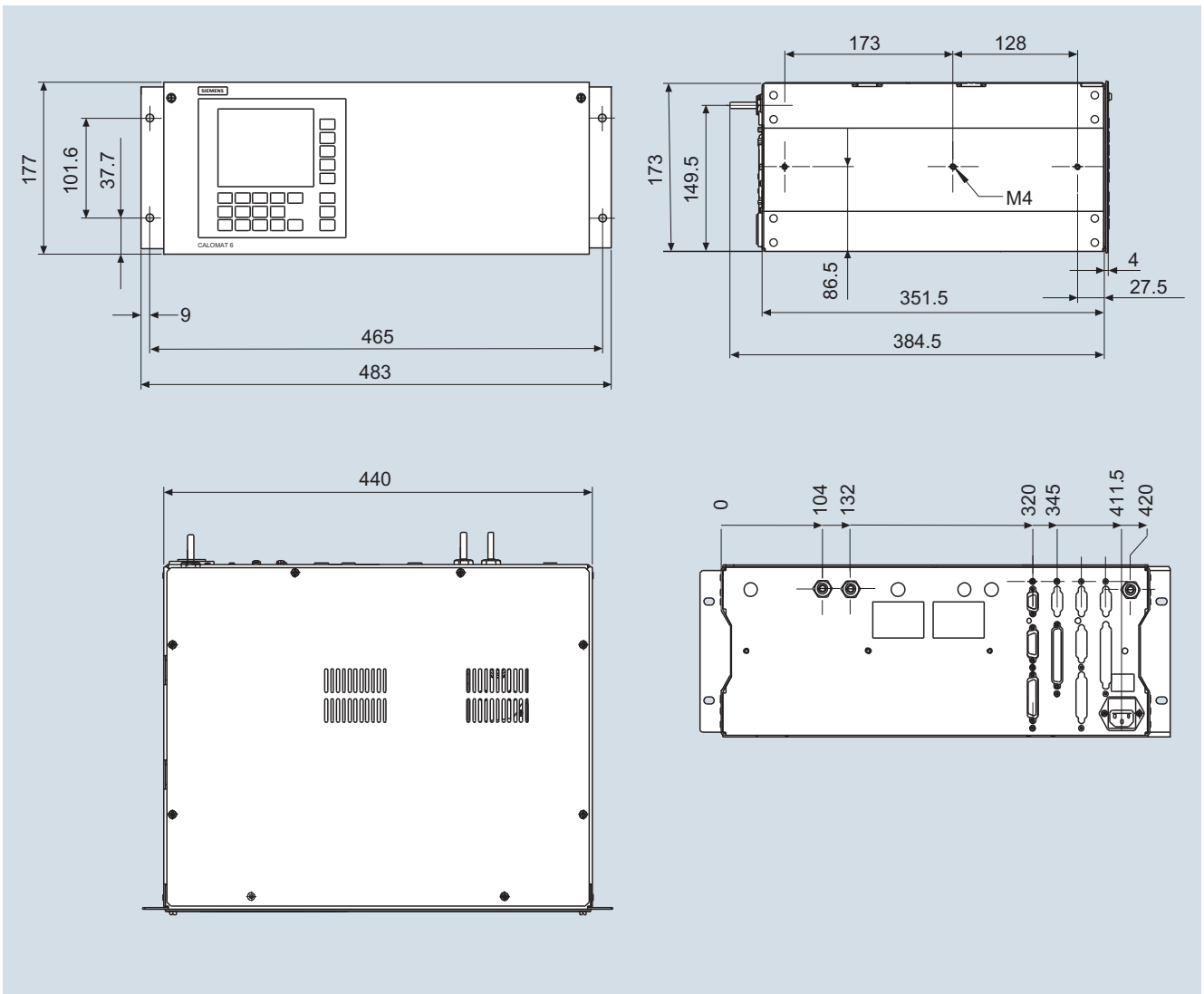
Selection and ordering data

<i>Additional versions</i>	Order code
Add "-Z" to Article No. and specify Order codes.	
Telescopic rails (2 units)	A31
TAG labels (specific lettering based on customer information)	B03
Clean for O ₂ service (specially cleaned gas path)	Y02
Measuring range indication in plain text, if different from the standard setting	Y11
<i>Accessories</i>	Article No.
RS 485/Ethernet converter	A5E00852383
RS 485/RS 232 converter	C79451-Z1589-U1
RS 485/USB converter	A5E00852382
AUTOCAL function with 8 digital inputs/outputs	C79451-A3480-D511
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA	A5E00057307
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS DP	A5E00057312
Set of Torx screwdrivers	A5E34821625

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19" rack unit

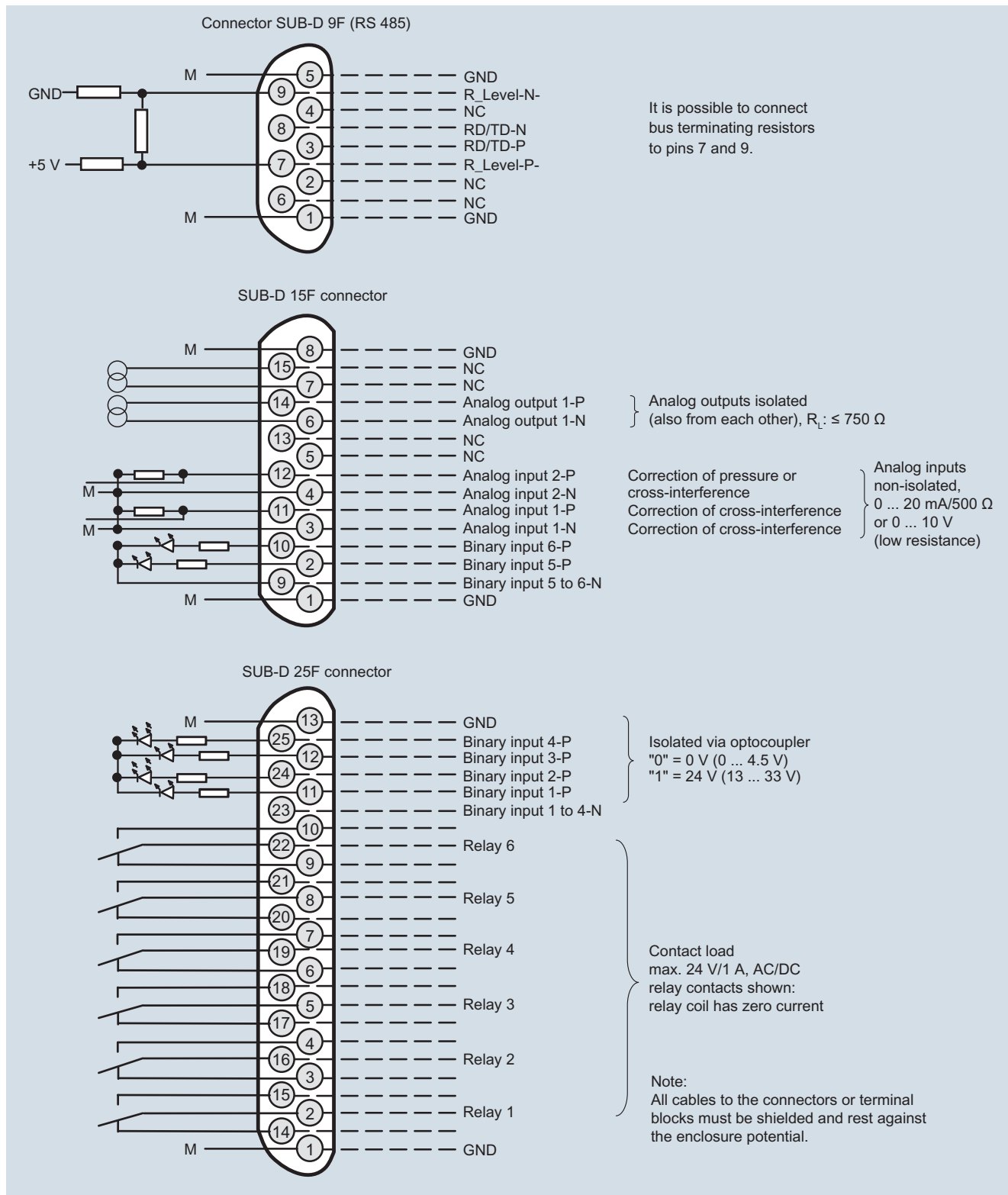
Dimensional drawings



CALOMAT 6, 19" unit, dimensions in mm

Schematics

Pin assignment (electrical and gas connections)



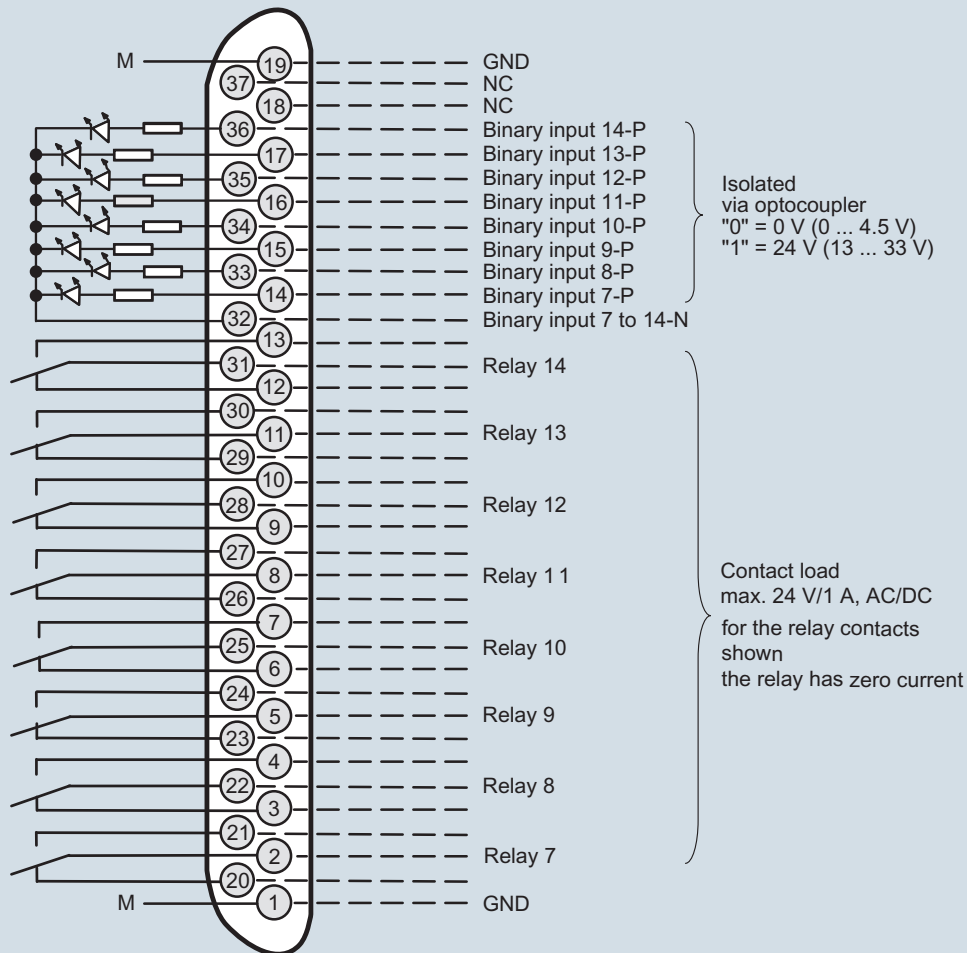
CALOMAT 6, 19" unit, pin assignment

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19" rack unit

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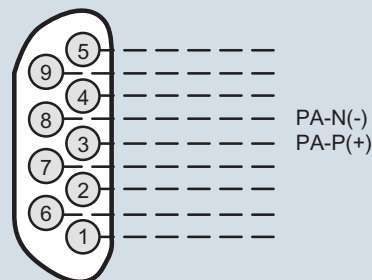
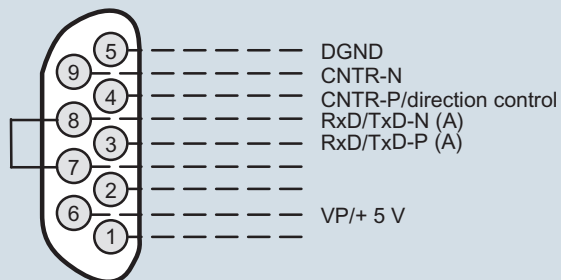
Connector SUB-D 37F (option)



Connector SUB-D 9F
PROFIBUS DP

optional

Connector SUB-D 9M
PROFIBUS PA



Note:

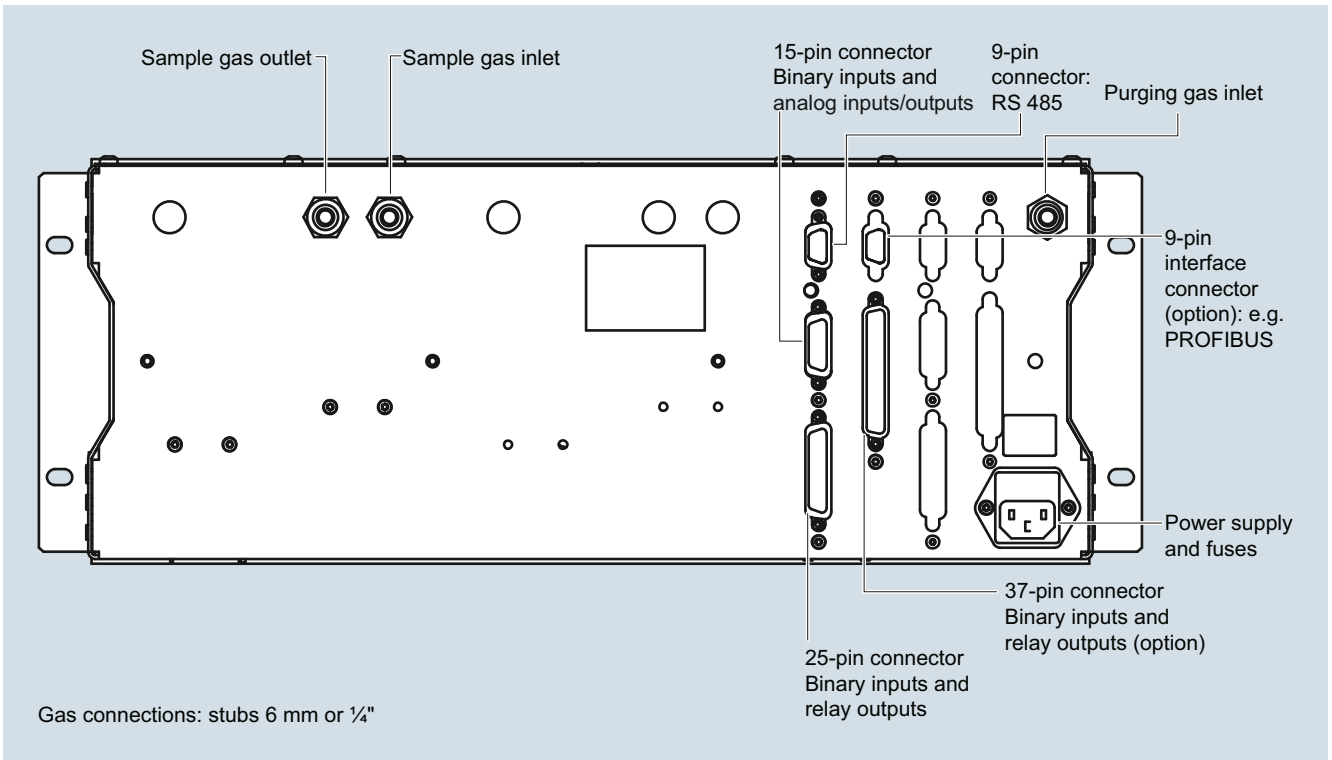
All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

CALOMAT 6, 19" unit, pin assignment of AUTOCAL board and PROFIBUS connectors

Continuous Gas Analyzers, extractive CALOMAT 6

19" rack unit

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CALOMAT 6, 19" unit, gas and electrical connections

Continuous Gas Analyzers, extractive

CALOMAT 6

Field device

Technical specifications

General (based on DIN EN 61207 / IEC 1207. All data refers to the binary mixture H₂ in N₂)

Measuring ranges	4, internally and externally switchable; automatic measuring range changeover also possible
Largest possible measuring span	100 vol.% H ₂ (for smallest measuring span, see "Function")
Measuring ranges with suppressed zero point	Any zero point within 0 ... 100 vol.% can be implemented; smallest possible measuring span: 5 % H ₂
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 61326/A1 and EN 61010/1

Design, enclosure

Degree of protection	IP65 according to EN 60529
Weight	Approx. 25 kg

Electrical characteristics

EMC (Electromagnetic Compatibility) (All signal lines must be shielded. Measured value deviations of up to 4 % of the smallest measuring range may occur in ranges with strong electromagnetic interference.)	In accordance with standard requirements of NAMUR NE21 (08/98)
Electrical safety	In accordance with EN 61010-1; overvoltage category II
Power supply (see rating plate)	100 V -10 % ... 120 V +10 % AC, 48 ... 63 Hz or 200 V -10 % ... 240 V +10 % AC, 48 ... 63 Hz
Power consumption (unit)	Approx. 20 VA
Fuse values	100 ... 120 V: 1.0T/250 200 ... 240 V: 0.63 T/250

Gas inlet conditions

Sample gas pressure	800 ... 1 100 hPa (absolute)
Sample gas flow	30 ... 90 l/h (0.5 ... 1.5 l/min)
Sample gas temperature	Min. 0 to max. 50 °C, but above the dew point
Temperature of the measuring cell	Approx. 60 °C
Sample gas humidity	< 90 % relative humidity
Purging gas pressure	
• Permanent	165 hPa above ambient pressure
• For short periods	Max. 250 hPa above ambient pressure

Dynamic response (relating to sample gas pressure 1 000 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Warm-up period	< 30 min (the technical specification will be met after 2 hours)
Delayed display (T ₉₀)	< 5 s
Electrical damping	0 ... 100 s, parameterizable
Dead time (at 1 l/min)	Approx. 0.5 s

Measuring response (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Output signal fluctuation (maximum accuracy achieved after 2 hours)	< ± 0.75 % of the smallest possible measuring range according to rating plate, with electronic damping constant of 1 s ($\sigma = 0.25 %$)
Zero point drift	< ± 1 %/week of the smallest possible measuring span according to rating plate
Measured-value drift	< ± 1 %/week of the smallest possible measuring span according to rating plate
Repeatability	< 1 % of the current measuring range
Detection limit	1 % of the current measuring range
Linearity error	< ± 1 % of the current measuring range

Influencing variables (relating to sample gas pressure 1013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Ambient temperature	< 1 %/10 K referred to smallest possible measuring span according to rating plate
Carrier gases	Deviation from zero point (for influence of interfering gas see paragraph titled "Interference influences")
Sample gas flow	< 0.2 % of the smallest possible span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range
Sample gas pressure	< 1 % of the current measuring range with a pressure change of 100 hPa

Electrical inputs and outputs

Analog output	0/2/4 ... 20 mA, isolated; load max. 750 Ω
Relay outputs	6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; load: 24 V AC/DC/1 A, isolated
Analog inputs	2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and correction of cross-interference
Binary inputs	6, designed for 24 V, isolated, freely parameterizable, e.g. for measurement range switchover
Serial interface	RS 485
Options	AUTOCAL function with 8 additional binary inputs and relay outputs each, also with PROFIBUS PA or PROFIBUS DP

Climatic conditions

Permissible ambient temperature	-30 ... +70 °C during storage and transportation, 5 ... 45 °C during operation
Permissible humidity (dew point must not be undershot)	< 90 % relative humidity as annual average, during storage and transportation

Selection and ordering data		Article No.	
CALOMAT 6 gas analyzer For field installation		7MB2511-	0 - A
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			Cannot be combined
Connections for sample gas Ferrule screw connection for pipe, outer diameter 6 mm Ferrule screw connection for pipe, outer diameter 1/4"		0 1	
<u>Measured component</u>	<u>Smallest/largest measuring range</u>		
H ₂ in N ₂	0 ... 1/100 %	AA	AA
H ₂ in N ₂ (blast furnace gas measurement) ¹⁾	0 ... 5/100 %	AW	AW
H ₂ in N ₂ (converter measurement) ¹⁾	0 ... 5/100 %	AX	AX
H ₂ in N ₂ (wood gasification) ¹⁾	0 ... 5/100 %	AY	AY
H ₂ in Ar	0 ... 1/100 %	AB	AB
H ₂ in NH ₃	0 ... 1/100 %	AC	AC
He in N ₂	0 ... 2/100 %	BA	
He in Ar	0 ... 2/100 %	BB	
He in H ₂	0 ... 10/80 %	BC	BC
Ar in N ₂	0 ... 10/100 %	CA	
Ar in O ₂	0 ... 10/100 %	CB	
CO ₂ in N ₂	0 ... 20/100 %	DA	
CH ₄ in Ar	0 ... 15/100 %	EA	EA
NH ₃ in N ₂	0 ... 10/30 %	FA	FA
H ₂ monitoring (turbo generators)		GA	GA
• CO ₂ in air	0 ... 100 %		
• H ₂ in CO ₂	0 ... 100 %		
• H ₂ in air	80 ... 100 %		
<u>Add-on electronics</u>			
Without		0	
AUTOCAL function		1	
• With 8 additional digital inputs and outputs		6	6
• With 8 additional digital inputs/outputs and PROFIBUS PA interface		7	7
• With 8 additional digital inputs/outputs and PROFIBUS DP interface		8	8
• With 8 additional digital inputs/outputs and PROFIBUS PA Ex-i interface			
<u>Power supply</u>			
100 ... 120 V AC, 48 ... 63 Hz		0	
200 ... 240 V AC, 48 ... 63 Hz		1	
<u>Explosion protection, incl. certificate</u>			
Without		A	
Acc. to ATEX II 3G, non-flammable gases		B	B
Acc. to ATEX II 3G; flammable gases ²⁾		C	
FM/CSA certificate – Class I Div 2		D	D
According to ATEX II 2G, leakage compensation ²⁾		E	E
According to ATEX II 2G, continuous purging ²⁾		F	F
ATEX II 3D certificate; potentially explosive dust atmospheres		G	
• In non-hazardous gas zone		H	
• In Ex zone acc. to ATEX II 3G, non-flammable gases		I	
• In Ex zone acc. to ATEX II 3G, flammable gases ²⁾		J	
<u>Language</u> (supplied documentation, software)			
German		0	
English		1	
French		2	
Spanish		3	
Italian		4	

¹⁾ Ready to enter external correction of cross-interferences for CO, CO₂ and CH₄ (CH₄ only for blast furnace gas and wood gasification).

²⁾ Only in connection with an approved purging unit.

Continuous Gas Analyzers, extractive

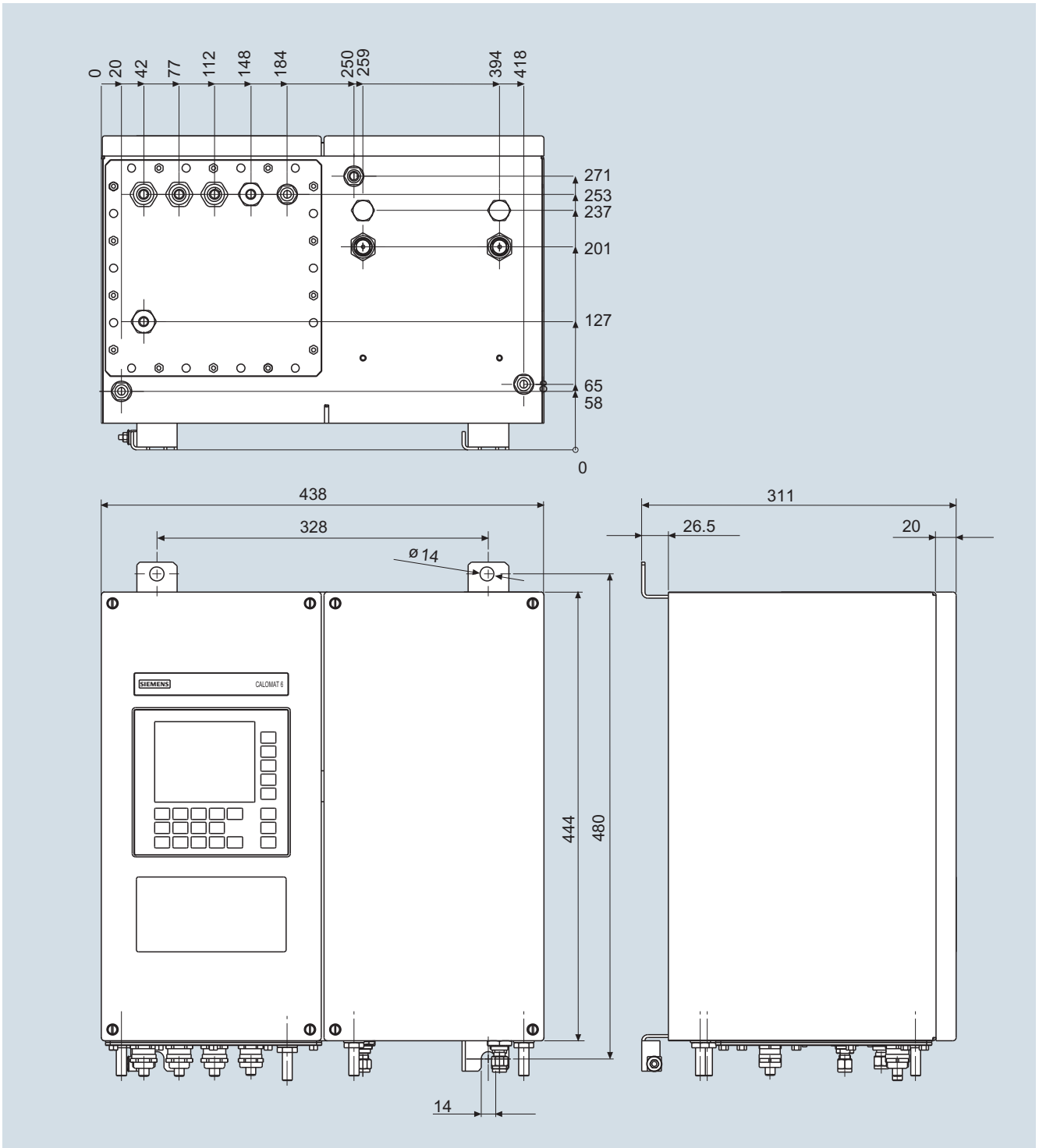
CALOMAT 6

Field device

Selection and ordering data

<i>Additional versions</i>	Order code
Add "-Z" to Article No. and specify Order codes.	
TAG labels (specific lettering based on customer information)	B03
BARTEC Ex p control unit "Leakage compensation"	E71
BARTEC Ex p control unit "Continuous purging"	E72
Clean for O ₂ service (specially cleaned gas path)	Y02
Measuring range indication in plain text, if different from the standard setting	Y11
<i>Additional units for Ex versions</i>	Article No.
<u>ATEX Category II 2G (zone 1)</u>	
BARTEC Ex p control unit, 230 V, "leakage compensation"	7MB8000-2BA
BARTEC Ex p control unit, 115 V, "leakage compensation"	7MB8000-2BB
BARTEC Ex p control unit, 230 V, "continuous purging"	7MB8000-2CA
BARTEC Ex p control unit, 115 V, "continuous purging"	7MB8000-2CB
Ex i isolating transformer	7MB8000-3AB
Ex isolating relay, 230 V	7MB8000-4AA
Ex isolating relay, 110 V	7MB8000-4AB
Differential pressure switch for corrosive and non-corrosive gases	7MB8000-5AA
Stainless steel flame arrestor	7MB8000-6BA
Hastelloy flame arrestor	7MB8000-6BB
<u>ATEX Category II 3G (zone 2)</u>	
BARTEC Ex p control unit, 230 V, "continuous purging"	7MB8000-2CA
BARTEC Ex p control unit, 115 V, "continuous purging"	7MB8000-2CB
<u>FM/CSA (Class I Div. 2)</u>	
Ex purging unit Minipurge FM	7MB8000-1AA
<i>Accessories</i>	
RS 485/Ethernet converter	A5E00852383
RS 485/RS 232 converter	C79451-Z1589-U1
RS 485/USB converter	A5E00852382
AUTOCAL function with 8 digital inputs/outputs	A5E00064223
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA	A5E00057315
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS DP	A5E00057318
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA Ex i (firmware 4.1.10 required)	A5E00057317
Set of Torx screwdrivers	A5E34821625

Dimensional drawings



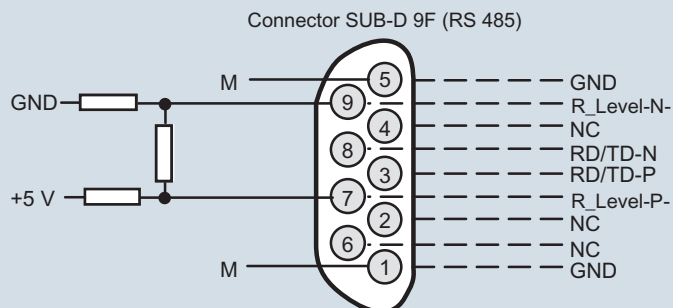
CALOMAT 6, field unit, dimensions in mm

Continuous Gas Analyzers, extractive CALOMAT 6

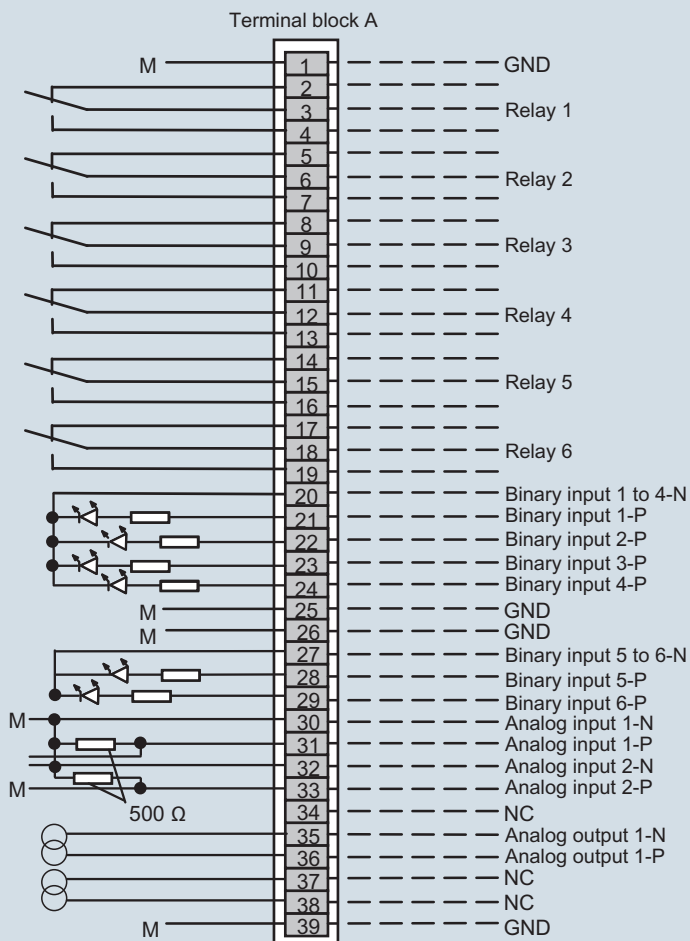
Field device

Schematics

Pin assignment (electrical and gas connections)



It is possible to connect bus terminating resistors to pins 7 and 9.



Contact load max.
24 V/1 A, AC/DC; relay contacts
shown: relay coil has zero current

Isolated via optocoupler
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)

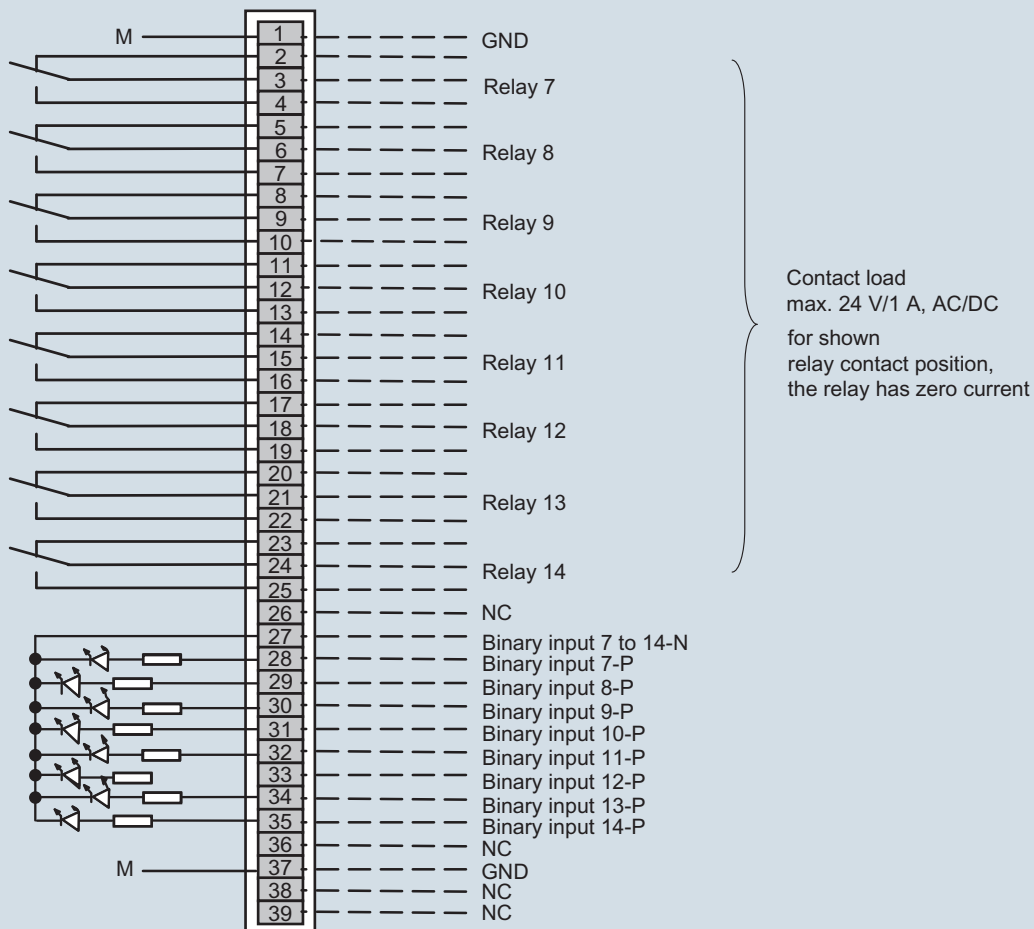
Isolated via optocoupler
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)
} Correction of cross-interference } Analog inputs non-isolated,
} Pressure correction } 0 ... 20 mA or 0 ... 10 V (internal resistance ≤ 500 Ω)

} Analog outputs isolated

Note:
All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

CALOMAT 6, field unit, connector and terminal assignment

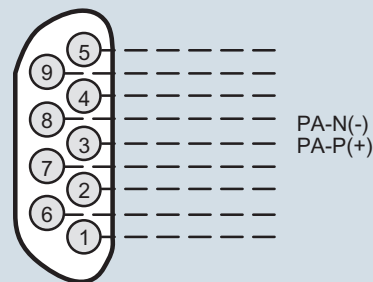
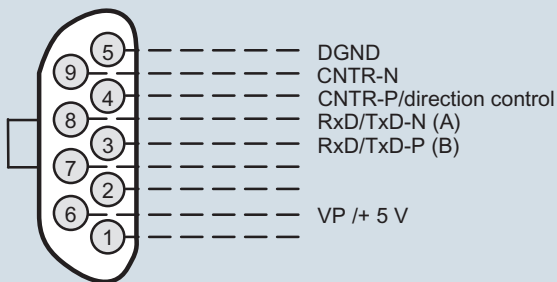
Terminal block B (option)



Connector SUB-D 9F-X90
PROFIBUS DP

optional

Connector SUB-D 9M-X90
PROFIBUS PA

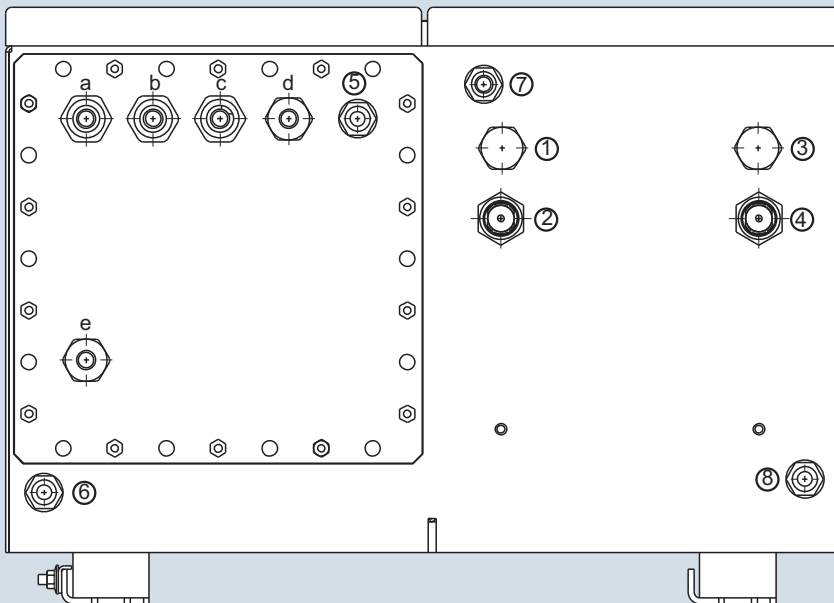


Note:
All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

CALOMAT 6, field unit, connector and terminal assignment of the AUTOCAL board and PROFIBUS connectors

Continuous Gas Analyzers, extractive CALOMAT 6

Field device



Gas connections

- | | | |
|-----|---|--|
| ① | not used | } Clamping
gland for pipe
Ø 6 mm or 1/4" |
| ② | Sample gas inlet | |
| ③ | not used | |
| ④ | Sample gas outlet | |
| ⑤-⑧ | Purging gas inlets/outlets stubs Ø 10 mm or 3/8 " | |

Electrical connections

- | | |
|-------|--|
| a - c | Signal cable (Ø 10 ... 14 mm)
(analog + digital): cable gland M20x1.5 |
| d | Interface connection: (Ø 7 ... 12 mm)
cable gland M20x1.5 |
| e | Power supply: (Ø 7 ... 12 mm)
cable gland M20x1.5 |

CALOMAT 6, field unit, gas and electrical connections

Selection and ordering data

Operating instructions	Article No.
CALOMAT 6 Thermal conductivity gas analyzer	
• German	A5E00116454
• English	A5E00116455
• French	A5E00116456
• Italian	A5E00116457
• Spanish	A5E00116458
Gas analyzers of Series 6 and ULTRAMAT 23 Schnittstelle/Interface PROFIBUS DP/PA	
• German and English	A5E00054148

Suggestions for spare parts

Selection and ordering data

	7MB2521	7MB2511	7MB2511 Ex	2 years (quantity)	5 years (quantity)	Article No.
Analyzer unit						
Measuring cell	x	x	x	1	1	A5E00095332
O ring (set of 4)	x	x	x	1	2	A5E00124182
Electronics						
Fuse (device fuse)			x	1	2	A5E00061505
Front plate without LC display	x			1	1	C79165-A3042-B508
Motherboard, with firmware: see spare parts list	x	x	x	-	1	
Adapter plate, LCD/keyboard	x	x		1	1	C79451-A3474-B605
LC display (non-Ex version)	x			1	1	W75025-B5001-B1
Line transformer, 115 V	x	x	x	-	1	W75040-B21-D80
Line transformer, 230 V	x	x	x	-	1	W75040-B31-D80
Connector filter	x	x	x	-	1	W75041-E5602-K2
Fusible element, T 0.63/250 V	x	x		2	3	W79054-L1010-T630
Fusible element, 1 A, 110/120 V	x	x	x	2	3	W79054-L1011-T100

If the CALOMAT 6 is supplied with a specially cleaned gas path for high oxygen context ("Cleaned for O₂ service"), please ensure that you specify this when ordering spare parts. This is the only way to guarantee that the gas path will continue to comply with the special requirements for this version.